Stroke Reperfusion Therapy: IV t-PA Treatment Phase

IV tPA Administration for Adult Patients Arriving Within 3 Hours.

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Comments in brackets denote activities specific to MGH, or additional commentary regarding national standards or guidelines. For example:

Prior to making any medical decisions, please view our disclaimer.

Consent Form

- IV Consent Form

Indications for IV tPA

- Age greater than or equal to 18 yrs
- A significant neurologic deficit expected to result in long term disability
- Non-contrast CT scan showing no hemorrhage or well-established new infarct
- Acute ischemic stroke symptoms with onset or last known well, clearly defined, less than 3 hours before t-PA will be given (note additional warnings for the 3-4.5 hour time period below)

Contraindications

These are based on FDA approved labeling of alteplase.

Contraindications include any of the following:

- SBP greater than 185 or DBP greater than 110 mmHg (see BP Management) [despite medical intervention to lower it]
- Recent intracranial or spinal surgery, head trauma, or stroke (less than 3 months)
- History of intracranial hemorrhage or brain aneurysm or vascular malformation or brain tumor
[my consider iv tPA in patients with CNS lesions that have a very low likelihood of bleeding such as small unruptured aneurysms or benign tumors with low vascularity]

- Active internal bleeding (within prior 21 days)
- Platelets less than 100,000, PTT greater than 40 sec after heparin use, or PT greater than 15 or INR greater than 1.7, or known bleeding diathesis
  [see protocol for starting tPA while awaiting results of PT/PTT]
- Current use of novel oral anticoagulants [NOACs] (direct thrombin inhibitors or factor Xa inhibitors) within 48 hours of evaluation or with abnormal labs if >48hrs (aPTT, INR, platelet count, or ECT, TT, or factor Xa essays)
- Suspicion of subarachnoid hemorrhage
  [by imaging or clinical presentation]
- Arterial puncture at non-compressible site within prior 7 days
- CT findings (ICH, SAH, or major acute infarct signs)
  [e.g. hypodensity greater than 1/3 cerebral hemisphere]

**Warnings**

These conditions may increase the risk of unfavorable outcomes but are not necessarily a contraindication to treatment:

- Seizure at onset
  [if residual deficits are thought to be due to the postictal state rather than to ischemia]
- Major surgery/trauma (less than 15 days)
- Recent GI or urinary tract bleeding (within 21 days)
- Stroke severity - too severe (e.g., NIHSS greater than 22)
  [At MGH, we typically do not exclude patients based on an increased NIHSS alone.]
- Glucose less than 50 or greater than 400 mg/dl
  [if residual deficits are due to the altered metabolic state rather than to ischemia. If rapid diagnosis of vascular occlusion can be made, treatment may be given.]
- Recent MI (within 3 months) and/or Left heart thrombus documented
- Increased risk of bleeding due to any of the following:
  - Acute pericarditis
  - Subacute bacterial endocarditis (SBE)
  - Hemostatic defects including those secondary to severe hepatic or renal disease
  - Pregnancy
  - Diabetic hemorrhagic retinopathy, or other hemorrhagic ophthalmic conditions
  - Septic thrombophlebitis or occluded AV cannula at seriously infected site
  - Patients currently receiving oral anticoagulants, e.g., Warfarin sodium
    [and INR greater than 1.7]
  - Advanced age
- Rapid improvement
- Stroke severity too mild
  [e.g. anticipate ability to discharge to home]
- Life expectancy less than 1 year or severe co-morbid illness or CMO on admission

*For extended window IV thrombolysis (3.0-4.5 hours from last seen well), additional relative exclusion criteria exist

**t-PA Dosing**

Calculate the exact dose of t-PA using the [t-PA Dosing Calculator](#) if patient's weight is known or measured. If estimating weight to 10 lb intervals, the Dosing Sheet below may be used.

<table>
<thead>
<tr>
<th>Estimated Weight (lbs)</th>
<th>Conversion to Kilograms (Kg)</th>
<th>Total iv t-PA Dose (mg) at 0.9 mg/kg</th>
<th>t-PA Bolus (mg) <em>10% of total</em></th>
<th>t-PA Bolus (ml)</th>
<th>Discard Dose t-PA (Not for infusion)</th>
<th>Infusion Dose (mg)</th>
<th>Infusion Rate (ml/hr)</th>
</tr>
</thead>
<tbody>
<tr>
<td>220+</td>
<td>100.0</td>
<td>90.0</td>
<td>9.0</td>
<td>9.0</td>
<td>10.0</td>
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<td>85.9</td>
<td>8.6</td>
<td>8.6</td>
<td>14.1</td>
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<tr>
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<td>86.4</td>
<td>77.7</td>
<td>7.8</td>
<td>7.8</td>
<td>22.3</td>
<td>70.0</td>
<td>70.0</td>
</tr>
</tbody>
</table>
### Treatment Phase

**ED Nurse Responsibilities:**

- Mix and draw up tPA per protocol:
  - Provide physician with the 10% bolus dose, either in CT area or ED bay
  - Prepare the infusion
  - If tPA is mixed but patient does not receive drug, notify pharmacist to return mixed t-PA and initiate rebate
- Once infusion begins monitor vital signs as follows:
  - Every 15 min for 2 hours, then:
  - Every 30 minutes for 6 hours, then:
  - Every 60 minutes for 16 hours
- Notify physician immediately if SBP/DBP greater than 175/100
- Do not insert Foley catheter or nasogastric tube unless ordered
- Document hourly neurologic reassessment (more frequently if patient’s condition changes)

**ED Physician Responsibilities:**

- Stand-by for emergent management of potential known side effects of IV t-PA:
  - Bleeding complications
  - Angioedema

**Neurologist Responsibilities (includes Resident, Fellow or Attending):**

- Calculate IV tPA dose based on weight estimate and tPA dosing table:
  - Document estimated weight
  - Review with nursing staff to ensure accuracy
  - Confirm BP within safe limits
  - Write order for tPA total dose as a bolus plus infusion
  - Administer the 10% bolus over 1 minute and document time on ED medication order sheet
- Repeat NIHSS evaluation if patient exam has changed significantly
- Facilitate IAT for patients that are eligible
- Strict control of blood pressure for 24 hours per protocol
- Request an Acute Stroke admission bed to the CMF/ICU Service. The patient remains under the care of the Acute Stroke Team until officially transferred to the CMF/ICU Attending.
- Patients eligible for the Acute Stroke Care Unit (ASCU) admission on Lunder 7 post-IV t-PA must be strictly considered following the ACSU protocol.
- Coordinate the post tPA care with the ED attending to ensure continuity until the patient can be transferred out of the ED
- Management of blood pressure (see BP Management)
Post Treatment Phase

ED Nurse Responsibilities

- Document neurologic assessment hourly or more frequently if changes occur
- Vital sign monitoring as described above under Treatment Phase
- Verify the patency of IV and completion of the tPA dose
- Provide nursing report to the accepting nurse
- Provide family/patient with appropriate resource materials about stroke

Neurologist Responsibilities (includes Resident, Fellow or Attending)

- ICU/Acute Stroke Care Unit admission for monitoring during first 24 hours
- Use the standard post- t-PA order set and modify, as indicated
- Order routine non-contrast head CT at 24 hours post treatment (or STAT with any worsening in neurological status)
- Vital signs every 15 minutes for 2 hours, then every 30 minutes for 6 hours, then every 1 hour for 16 hours
- Strict control of blood pressure for 24 hours per protocol
- Restrict patient intake to strict NPO including meds until swallowing screen performed and passed
- Continuous pulse oximetry monitoring, order oxygen by nasal cannula or mask to maintain O2 sat greater than 95%
- Tylenol 650 mg po(pr if still NPO) every 4 hours PRN T greater than 99.4; consider cooling for T greater than 102
- No antiplatelet agents or anticoagulants (including heparins for DVT prophylaxis) in first 24 hours
- No Foley catheter, nasogastric tube, arterial catheter or central venous catheter for 24 hr, unless absolutely necessary
- For any acute worsening of neurologic condition:
  - For suspected symptomatic hemorrhage after t-PA or other plasminogen activator has been given:
    - Hold administration of IV t-PA if still infusing until head CT or alternative imaging (if hemorrhage is suspected elsewhere) has been completed and shows no evidence of bleeding.
    - Exclude other possible causes of neurologic worsening or acute hemodynamic instability.
    - Check STAT labs: CBC, PT, PTT, platelets, fibrinogen and D-dimer.
    - Send blood bank sample for type and screen, cross-match and hold packed red cells appropriate to the hemorrhage volume, location, and associated symptoms
    - For uncontrolled, life-threatening bleeding, consider aminocaproic acid (Amicar) 10 g IV in 250 cc NS IV over 1 hr (note: there is a significant risk of pathologic thrombosis with Amicar).
    - For systemic hemorrhage, compress any compressible sites of bleeding, and consult appropriate additional services to consider mechanically occluding arterial or venous sources of medically uncontrollable bleeding.
  - For confirmed symptomatic hemorrhage on Head CT
    - Check STAT labs: CBC, PT, PTT, platelets, fibrinogen and D-dimer.
    - If hypofibrinogenemia present, treat with anti-fibrinolytic or cryoprecipitate (or both) as follows:
      - Give anti-fibrinolytic: eg, amicar 5 gram bolus i.v. over 15- 30 min
      - If fibrinogen less than 100 mg/dL, then give cryoprecipitate 10 units. If still bleeding at 1 hr and fibrinogen level still less than 100 mg/dL, repeat cryoprecipitate dose.
      - Institute frequent neurochecks and therapy of acutely elevated ICP, as needed.
  - Additional Options or considerations
    1. If patient has a known platelet disorder, give 6 units platelets.
    2. For uncontrolled, life-threatening bleeding, consider aminocaproic acid (Amicar) 10 grams IV in 250 cc NS IV over 1 hr as a last resort . Note there is a significant risk of pathologic thrombosis with Amicar.
    3. Serious systemic hemorrhage should be treated in a similar manner. Manually compress and compressible sites of bleeding, and consult appropriate additional services to consider mechanically occluding arterial or venous sources of medically uncontrollable bleeding

For Allergic reactions
- If mild, eg rash, itching: Immediately stop the t-PA infusion
- Administer diphenhydramine (Bendaryl) 25-50mg IV x 1.
Consider steroid, i.e., hydrocortisone 100mg IV x 1 (or methylprednisolone dosepack (Medrol Pak) dose pack, if patient can take PO)

Nebulization if bronchospasm (uncommon)
If moderate or severe, eg facial or lingual swelling, anaphylaxis, etc:
Immediately stop the t-PA infusion, alert the ED team
Administer epinephrine (Epipen(R) 0.3mg in 0.3ml) IM (or if severe Epinephrine IV)
Bolus 1-2L NS rapidly
Supplement oxygen. The patient may require intubation. Facilitate respiratory evaluation and securing the airway
Coordinate care with accepting CMF team resident

References


Authoring Information

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